

## 7. REGULATIONS AND ADVISORIES

The national and state regulations and guidelines pertaining to ethylbenzene in air, water, and other media are summarized in Table 7- 1. No international regulations or guidelines applicable to ethylbenzene were found.

ATSDR has derived an intermediate inhalation minimal risk level (MRL) of 1.0 ppm for ethylbenzene based on a NOAEL of 97 ppm for developmental effects in Wistar rats (Andrew et al. 1981).

The EPA oral reference dose (RfD) for ethylbenzene is 0.1 mg/kg/day, based on the LOAEL for liver and kidney toxicity in rats administered 291 mg/kg/day ethylbenzene (IRIS 1996). The EPA inhalation reference concentration (RfC) for ethylbenzene is 1 mg/m<sup>3</sup> based on developmental toxicity seen in rats and rabbits exposed to 4,340 mg/m<sup>3</sup> (IRIS 1996).

The EPA has classified ethylbenzene as Group D (not classifiable as to human carcinogenicity), due to the lack of animal bioassays and human studies (IRIS 1996). The International Agency for Research on Cancer (IARC) and the National Toxicology Program have not classified the chemical for carcinogenicity.

Ethylbenzene is on the list of chemicals subject to the requirements of “The Emergency Planning and Community Right-to-Know Act of 1986” (EPCRA) (EPA 1988a). Section 313 of Title III of EPCRA, requires owners and operators of certain facilities that manufacture, import, process, or otherwise use the chemicals on this list to report annually their release of those chemicals to any environmental media (U.S. Congress 1986).

OSHA requires employers of workers who are occupationally exposed to ethylbenzene to institute engineering controls and work practices to reduce and maintain employee exposure at or below permissible exposure limits (PELs). The employer must use controls and practices, if feasible, to reduce exposure to or below an 8-hour time-weighted average (TWA) of 100 ppm (OSHA 1974).

The EPA regulates ethylbenzene under the Clean Air Act (CAA) and has designated ethylbenzene as a hazardous air pollutant (HAP). The major source category for which ethylbenzene emissions are controlled

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is the synthetic organic chemicals manufacturing industry (SOCMI)-equipment leaks (EPA 1983a), distillation operations (EPA 1990), and reactor processes (EPA 1993a).

Ethylbenzene is regulated by the Clean Water Effluent Guidelines in Subchapter N of Title 40 of the Code of Federal Regulations. Electroplating is the point source category for which ethylbenzene is controlled as a total toxic organic (EPA 1981a). The point source categories for which ethylbenzene has a specific regulatory limitation include organic chemicals, plastics, and synthetic fibers (EPA 1987a, 1987b, 1987d, 1987e, 1987f, 1987g, 1987h, 1987i).

The Resource Conservation and Recovery Act (RCRA) identifies ethylbenzene as a hazardous waste from non-specific sources and has assigned the hazardous waste number, F003 (EPA 1981c).

Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), owners of vessels or facilities are required to immediately report release of ethylbenzene equal to or greater than the reportable quantity of 1,000 pounds (454 kg) (EPA 1985b).

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**Table 7-1. Regulations and Guidelines Applicable to Ethylbenzene**

Agency	Description	Information	References
<b>INTERNATIONAL</b>			
Guidelines:			
WHO	Drinking-water guideline values for health-related organics	300µg/L	WHO 1996
<b>NATIONAL</b>			
Regulations:			
a. Air:			
OSHA	Air contaminants		
	Permissible Exposure Limit (PEL) 8-hr. Time weighted average (TWA)	100 ppm	29 CFR 1910.1000 OSHA 1974 <sup>a</sup>
EPA OAR	Hazardous Air Pollutants	Yes	Clean Air Act Amendment Title III, Section 112 (b) U.S. Congress 1990
	Standards of Performance for New Stationary Sources-		
	Subpart VV: Equipment leaks of VOCs in the Synthetic Organic Chemicals Manufacturing Industry (SOCMI)--chemicals produced by affected facilities	Yes	40 CFR 60.489 EPA 1983a
	Subpart NNN: VOC emissions from SOCMI distillation operations-- chemical affected	Yes	40 CFR 60.667 EPA 1990
	Subpart RRR: VOC emissions from SOCMI reactor processes-- chemicals affected	Yes	40 CFR 60.707 EPA 1993a
	National Emission Standards for Hazardous Air Pollutants for Source Categories		
	National Emission Standards for Organic Hazardous Air Pollution from the Synthetic Organic Chemical Manufacturing Industry- Delegation of Authority	Yes	40 CFR 63.106 EPA 1994a
	Regulation of Fuels and Fuel Additives Reformulated Gasoline- Measurement of reformulated gasoline fuel parameters	Yes	40 CFR 80.46 EPA 1994c
b. Water			
EPA ODW	National Revised Primary Drinking Water Regulations: Maximum Contaminant Levels-		
	Maximum contaminant levels for organic chemicals	0.7 mg/L	40 CFR 141.61 EPA 1991a
	BAT for organic contaminants listed in 40 CFR 141.61 (a) and (g)	GAC PTA	

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**Table 7-1. Regulations and Guidelines Applicable to Ethylbenzene (continued)**

Agency	Description	Information	References
<u>NATIONAL</u> (cont.)			
EPA OW			
	Designation of Hazardous Substances		
	List of hazardous substances	Yes	40 CFR 116.4 EPA 1978
	Determination of Reportable Quantities for Hazardous Substances		
	RQ of hazardous substances designated pursuant to Section 311 of the CWA	1000 pounds (454 kg)	40 CFR 117.3 EPA 1985d
	EPA Administered Permit Programs: The NPDES-		
	Organic toxic pollutants in each of four fractions in analysis by GC/MS	Yes	40 CFR 122, App. D EPA 1983b
	Criteria and Standards for the NPDES-		
	Instructions for Form 2C, application for permit to discharge wastewater--hazardous substances	Yes	40 CFR 125 EPA 1984a
	Methods for organic chemical analysis of municipal and industrial wastewater (Methods 602, 624, and 1624)	Yes	40 CFR 136, App. A EPA 1973
	Designated as a toxic pollutant under Section 307 (a)(1) of the Federal Water Pollution Control Act	Yes	40 CFR 401.15 EPA 1979
	General pretreatment regulations for existing and new sources of pollution-		
	List of toxic pollutants	Yes	40 CFR 403, App. B EPA 1986a
	Pollutants eligible for a removal credit	Yes	40 CFR 403, App. G EPA 1993b
	Electroplating Point Source Category-		
	General definition	Yes	40 CFR 413.02 EPA 1981a
	Organic Chemicals, Plastics, and Synthetic fibers		
	Subpart B-Rayon Fibers-PSES		40 CFR 414.25 EPA 1987a
	Maximum for any one day	380 µg/L	
	Maximum for monthly average	142 µg/L	
	Subpart C-Other Fibers-PSES		40 CFR 414.35 EPA 1987b
	Maximum for any one day	380 µg/L	
	Maximum for monthly average	142 µg/L	

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**Table 7-1. Regulations and Guidelines Applicable to Ethylbenzene (continued)**

Agency	Description	Information	References
<u>NATIONAL</u> (cont.)			
	Subpart D-Thermoplastic Resins-PSES		40 CFR 414.45 EPA 1987d
	Maximum for any one day	380 µg/L	
	Maximum for monthly average	142 µg/L	
	Subpart E-Thermosetting Resins		40 CFR 414.55 EPA 1987e
	Maximum for any one day	380 µg/L	
	Maximum for monthly average	142 µg/L	
	Subpart F-Commodity Organic Chemicals		40 CFR 414.65 EPA 1987f
	Maximum for any one day	380 µg/L	
	Maximum for monthly average	142 µg/L	
	Subpart G-Bulk Organic Chemicals-PSES		40 CFR 414.75 EPA 1987g
	Maximum for any one day	380 µg/L	
	Maximum for monthly average	142 µg/L	
	Subpart H-Speciality Organic Chemicals--PSES		40 CFR 414.85 EPA 1987h
	Maximum for any one day	380 µg/L	
	Maximum for monthly average	142 µg/L	
	Subpart J-Direct Discharge Point Source That Do Not Use End-of Pipe Biological Treatment-effluent limitations: BAT and NSPS		40 CFR 414.101 EPA 1987i
	Maximum for any one day	380 µg/L	
	Maximum for monthly average	142 µg/L	
	Steam Electric Power Generating Point Source Category		
	Pretreatment standards for new sources (PSNS)		40 CFR 423.17 EPA 1982a
	Maximum for any time	0.2 mg/L	
	List of 126 priority pollutants	Yes	40 CFR 423, App. A EPA 1982b
	Metal Finishing Point Source Category		
	Metal finishing subcategory-Definition of total toxic organics (TTO)	>0.01 mg/L	40 CFR 433.10 EPA 1983c
	Pesticide Chemicals		
	Subpart D-Test Methods for Pesticide Pollutants		40 CFR 455.50, Table 4 EPA 1993c
	BAT and NSPS effluent limitations for priority pollutants for direct discharge point sources that use end-of-pipe biological treatment		
	Daily maximum	108 µg/L	
	Monthly average	32 µg/L	

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**Table 7-1. Regulations and Guidelines Applicable to Ethylbenzene (continued)**

Agency	Description	Information	References
<u>NATIONAL</u> (cont.)			
EPA OWRS	BAT and NSPS effluent limitations for priority pollutants for direct discharge point sources that do not use end-of-pipe biological treatment		40 CFR 455.50, Table 5 EPA 1993c
	Daily maximum	380 µ/L	
	Monthly average	142 µg/L	
	PSES and PSNS for priority pollutants		40 CFR 455.50, Table 6 EPA 1993c
	Daily maximum	380 µ/L	
	Monthly average	142 µg/L	
EPA OWRS	Ambient Water Quality Criteria For the Protection of Human Health:		IRIS 1996
	Ingestion of water and aquatic organisms	1.4 mg/L	
	Ingestion of aquatic organisms only	3.28 mg/L	
c. Other:			
DOT	Hazardous Materials Table	UN 1975	49 CFR 172.101 DOT 1990a
	Hazardous substances other than radionuclides: RQ	1000 pounds (454 kg)	49 CFR 172.101, App. A DOT 1990b
EPA-OERR	List of Hazardous Substances and Reportable Quantities	1000 pounds (453.6 Kg) (statutory)	40 CFR 302.4 EPA 1985b
		1000 pounds (454 Kg) (final RQ)	
	Toxic Chemical Release Reporting: Community Right-to-know		
	Specific toxic Chemical Listings	Yes	40 CFR 372.65 EPA 1988a
EPA-OSW	Criteria for Municipal Solid Waste Landfills		
	Constituents for detection monitoring	Yes	40 CFR 258, App. I EPA 1991b
	List of hazardous inorganic and organic constituents	Yes	40 CFR 258, App. II EPA 1991c
	Lists of Hazardous Wastes		
	Hazardous wastes from non-specific sources- F003 wastes	Yes	40 CFR 261.31 EPA 1981c
	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities		
	Ground-water monitoring list	Yes	40 CFR 264, App. IX EPA 1987c

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**Table 7-1. Regulations and Guidelines Applicable to Ethylbenzene (continued)**

Agency	Description	Information	References
<u>NATIONAL</u> (cont.)			
	Land Disposal Restrictions-		
	Waste prohibitions-solvent wastes	Yes	40 CFR 268.30 EPA 1988b
	Treatment standards-applicability of treatment standards	Yes	40 CFR 268.40 EPA 1987j
	Treatment standards expressed as concentration in waste extract (technical amendment to final rule-40 CFR 268.40)	<u>Wastewater</u> 0.057 mg/L <u>Nonwastewater</u> 10 mg/kg	62 FR 7502 EPA 1997
	Universal treatment standards (technical amendment to final rule-40 CFR 268.40)	<u>Wastewater</u> 0.057 mg/L <u>Nonwastewater</u> 10 mg/kg	62 FR 7502 EPA 1997
EPA OPPTS	Chemical Information Rules		
	Chemical lists and reporting periods	Yes	40 CFR 712.30 EPA 1982c
	Health and Safety Data Reporting		
	Affected substances and mixtures	Yes	40 CFR 716.120 EPA 1988d
Guidelines:			
a: Air:			
ACGIH	Ceiling Limit for Occupation Exposure (TLV-STEL)	0.4 ppm (0.37 mg/m <sup>3</sup> )	ACGIH 1996
	Biological Exposure Indices (BEI) Mandelic acid in urine ethyl benzene in end-exhaled air	1.5 g/g creatinine	
NIOSH	Recommended Exposure Limit for Occupation Exposure--Time-weighted average (TWA)-up to 10 hours per 40-hour workweek	100 ppm (435 mg/m <sup>3</sup> )	NIOSH 1997
	Recommended Exposure Limit for Occupation Exposure --Short-term exposure limit (STEL; 15-minute TWA	125 ppm (545 mg/m <sup>3</sup> )	
b. Water:			
EPA ODW	1-d Health Advisory (child)-draft	20 mg/L	EPA 1995c
	10-d Health Advisory (child)-draft	3 mg/L	
	Lifetime Health Advisory (adult)-draft	0.7 mg/L	
	Longer-term Health Advisory-draft	1 mg/L (child) 3 mg/L (adult)	
	RfD	0.1 mg/kg/d	
	Maximum contaminant level goals (MCLGs) for organic contaminants	0.7 mg/L	40 CFR 141.50 EPA 1985a

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<u>NATIONAL</u> (cont.)			
d. Other:			
ACGIH	Chemical Substance and other Issues Under Study	Yes	ACGIH 1996
EPA	Cancer Classification	D <sup>a</sup>	EPA 1995c
<u>STATE</u>			
Regulations and Guidelines:			
a. Air:	Average Acceptable Ambient Air Concentrations		NATICH 1992
AZ	1 hour	4.5x10 <sup>+3</sup> µg/m <sup>3</sup> (1.036 ppm)	
	24 hours	3.5x10 <sup>+3</sup> µg/m <sup>3</sup> (0.806 ppm)	
CT	8 hours	8.70x10 <sup>+3</sup> µg/m <sup>3</sup> (2.004 ppm)	
FL-FtLdle	8 hours	4.40 mg/m <sup>3</sup> (1.013 ppm)	
FL-Pinella	8 hours	4.35 x10 <sup>+3</sup> µg/m <sup>3</sup> (1.002 ppm)	
	24 hours	1.04 x10 <sup>+3</sup> µg/m <sup>3</sup> (0.240 ppm)	
FL-Tampa	8 hours	4.35 mg/m <sup>3</sup> (1.002 ppm)	
LA	8 hours	1.03x10 <sup>+4</sup> µg/m <sup>3</sup> (2.372 ppm)	
MA	24 hours	1.8x10 <sup>+2</sup> µg/m <sup>3</sup> (0.041 ppm)	
	Annual	1.8x10 <sup>+2</sup> µg/m <sup>3</sup> (0.041 ppm)	
ME	15 minutes	5.4x10 <sup>+4</sup> µg/m <sup>3</sup> (12.437 ppm)	
	24 hours	3.5x10 <sup>+3</sup> µg/m <sup>3</sup> (0.806 ppm)	
	1 year	3.5x10 <sup>+2</sup> µg/m <sup>3</sup> (0.081 ppm)	
ND	1 hour	5.43 mg/m <sup>3</sup> (1.251 ppm)	
	8 hours	4.34 mg/m <sup>3</sup> (1.000 ppm)	
NV	8 hours	1.04x10 <sup>+1</sup> mg/m <sup>3</sup> (2.395 ppm)	
NY	1 year	1.45x10 <sup>+3</sup> µg/m <sup>3</sup> (0.334 ppm)	



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**Table 7-1. Regulations and Guidelines Applicable to Ethylbenzene (continued)**

Agency	Description	Information	References
<u>STATE</u> (cont.)			
OK	24 hours	4.34x10 <sup>-4</sup> µg/m <sup>3</sup> (9.996 ppm)	
SC	24 hours	4.35x10 <sup>-3</sup> µg/m <sup>3</sup> (1.002 ppm)	
TX	30 minutes	2.0x10 <sup>-3</sup> µg/m <sup>3</sup> (0.461 ppm)	
	Annual	4.34x10 <sup>-2</sup> µg/m <sup>3</sup> (0.100 ppm)	
VA	24 hours	7.20x10 <sup>-3</sup> µg/m <sup>3</sup> (1.658 ppm)	
VT	8 hours	4.35x10 <sup>-4</sup> µg/m <sup>3</sup> (10.019 ppm)	
WA-SWEST	24 hours	1.45x10 <sup>-3</sup> µg/m <sup>3</sup> (1.002 ppm)	
b. Water			
Water Quality Criteria: Human Health			
AZ	Drinking water (guideline)	680 µg/L	FSTRAC 1995
CA	Drinking water (standard)	680 µg/L	
IL	Drinking water (guideline)	1 µg/L	FSTRAC 1990
KS	Drinking water (guideline)	680 µg/L	
MA	Drinking water (guideline)	700 µg/L	
	Groundwater (standard)	486 µg/L	MDEQE 1989
ME	Drinking water (guideline)	700 µg/L	FSTRAC 1995
MN	Drinking water (guideline)	700 µg/L	
NH	Drinking water (guideline)	700 µg/L	FSTRAC 1990
RI	Drinking water (guideline)	680 µg/L	
VT	Drinking water (standard)	680 µg/L	
WI	Drinking water (guideline)	700 µg/L	FSTRAC 1995

<sup>a</sup> A U.S. Court of Appeals rescinded the 1989 PELs promulgated by OSHA. Only PELs in place prior to the 1989 rule are currently allowed.

<sup>b</sup> The determinant is non-specific, since it is observed after exposure to some other chemicals.

BAT = Best Available Technology Economically Achievable; BEI = Biological Exposure CWA = Clean Water Act; EPA = Environmental Protection Agency; FSTRAC = Federal State Toxicology and Regulatory Alliance committee; GC/MS = Gas Chromatography/Mass Spectroscopy; IARC = International Agency for Research on Cancer; INCIN = Incineration; MCL = Maximum contaminant Level; MCLG = Maximum Contaminant Level Goal; NIOSH = National Institute of Occupational Safety and Health; NPDES = National Pollution Discharge Elimination System; NSPS = New Source Performance Standards; OAR = Office of Air and Radiation; ODW = Office of Drinking Water; OERR = Office of Emergency and Remedial Response; OSHA = Occupational Safety and Health Administration; OSW = Office of Solid Wastes; OTS = Office of Toxic Substances; PTA = Packed Tower Aeration; PEL = Permissible Exposure Limit; PSES = Pretreatment Standards for Existing Sources; RfD = Reference Dose; RQ = Reportable Quantities; SOCMII = Synthetic Organic Chemicals Manufacturing Industry; STEL = Short-term exposure Limit; TLV = Threshold Limit Value; TWA = Time-weighted Average; VOC = Volatile Organic Compound; WHO = World Health Organization

